

Amendments to the Specification:

Please replace the paragraph at lines 1 – 3 of page 1, which is the TITLE, with the following amended paragraph for the TITLE:

~~Biometric-acoustic writing system, and a method for personal identification and handwriting identification by means of biometric data~~ BIOMETRIC ACOUSTIC WRITING SYSTEM AND METHOD FOR IDENTIFYING INDIVIDUALS AND RECOGNIZING HANDWRITING BY USING BIOMETRIC DATA

Please replace the paragraph from line 37 of page 7 through line 2 of page 8 with the following amended paragraph:

In one preferred embodiment of the biometric writing system according to the invention, the microphone is arranged in an ~~airborne~~ air bearing sound chamber which is provided in the pen housing.

Please replace the paragraph at lines 4 and 5 of page 8 with the following amended paragraph:

The ~~airborne~~ air bearing sound chamber is preferably in the form of a resonator for specific natural frequencies.

Please replace the paragraph at lines 12-14 of page 8 with the following amended paragraph:

The ~~airborne~~ air bearing sound chamber can be coupled to the surrounding air via a housing opening which is provided in the pen housing.

Please replace the paragraph at lines 25-38 of page 22 and lines 1-20 of page 23 with the following amended paragraph:

As is illustrated in Figure 1, the microphone 5 is located in an ~~airborne~~ air bearing sound chamber 7 which is provided in the pen housing 3. The ~~airborne~~ air bearing sound chamber 7 is preferably in the form of a resonator for specific natural frequencies. The microphone 5 is surrounded by sound insulation 8a, 8b, which is provided in order to attenuate surrounding noises and passes only sound signals from the sound body 6 and the ~~airborne~~ air bearing sound chamber 7. The ~~airborne~~ air bearing sound chamber 7 can be coupled to the surrounding air via a housing opening which is provided in the pen housing 3. In this case, the housing opening can preferably be closed by means of a mechanical closure device 9, in order to suppress external noises. When the housing opening is open, the microphone 5 records the internal and external writing noise which is caused by the hand-guided writing movement, as a structure-borne and airborne sound signal, as well as a speech signal which originates from a person. The microphone 5 converts the recorded acoustic sound signals to an electrical sound signal. The electrical sound signal is converted by an analogue/digital converter to sound signal data for digital data processing. The digital signal data is supplied via a signal line 10 to a data processing unit 11 for further digital processing. The writing noise which is produced by writing and the speech signal which may additionally be received from the person are recorded either simultaneously or successively by the microphone 5, and are converted to corresponding sound signal data. The sound signal data which is supplied to the data processing unit 11 is preferably stored in a memory device 12 which is provided for this purpose and is connected to the data processing unit 11 via lines 13.

Please replace the paragraph from line 21 of page 29 through line 6 of page 30 with the following amended paragraph:

An acoustic writing signal or a writing noise is produced during writing with or movement of the pen 2 on the substrate 4. The pen 2 may be in the form of a ball-point pen refill, an ink nib or a wad with a defined tip. The substrate 4 is composed, for example, of paper or of a surface with a natural or additionally pronounced surface roughness and hardness. The surface roughness of the substrate 4 leads, while writing with the pen 2, to statistically stimulated, forced oscillations of the substrate and of the pen, that is to say statistical writing scratching noises and scrapping noises are produced from this. Depending on the design of the writing appliance and of the substrates, airborne sound loads and/or structure-borne sound loads are produced, from this and are transmitted to the microphone 5 within the pen housing 3. The pen 2 together with the housing 3 in the form of a sound body, as well

as the ~~airborne~~ air bearing sound chamber 7 in the pen housing 3, can be designed optimally on the basis of acoustic laws. The sound body 6 and the ~~airborne~~ air bearing sound area 7 are preferably defined as resonators at specific frequencies. In this case, frequencies are preferably used which have the greatest dynamic range in terms of amplitude changes while writing.

Please replace the paragraph from line 8 of page 30 through line 1 of page 31 with the following amended paragraph:

While writing with the pen 2, the microphone 5 emits a sound time signal which is significantly above the noise level and whose sound intensity depends on the writing speed, while a very small proportion of it is dependent on the different roughness of the writing substrate and on the different mean contact pressure of the pen refill 2. Sound intensity of the recorded sound time signal increases with the writing speed. If the writing speed is the same, the intensity differences between different writing paper surfaces are negligible. The frequency spectrum of the recorded time signal comprises a continuous noise spectrum, with significant characteristic frequency lines superimposed on it. The frequency lines occur mainly at frequencies below 2 kHz. The amplitudes of these frequency lines increase significantly with the writing speed, at the same frequency. The amplitudes of the frequency lines increase to a minor extent as the surface roughness of the writing substrate 4 increases. In this case, the frequencies remain unchanged. For the same writing speed, the amplitudes are virtually independent of the writing substrate 4 that is used. The microphone 5, which attenuates airborne sound, is insensitive to sound events in the surrounding area. If the pen housing 3 is completely closed, the airborne sound chamber 7 has no connection to the surrounding air. If the ~~airborne~~ air bearing sound chamber 7 is closed, environmental noises, in particular spoken words or motor noises, have no influence on the recorded sound time signal while writing. In this case, the microphone 5 recorded only the structure-borne sound that is produced via the pen refill.

Please replace the paragraph from line 1 of page 45 through line 14 of page 46 with the following amended paragraph:

List of reference symbols

1 Biometric acoustic writing system

| | |
|-----------|--|
| 2 | Pen |
| 3 | Pen housing |
| 4 | Substrate |
| 5a, 5b | Microphones |
| 6 | Sound body |
| 7 | Airborne <u>Air bearing</u> sound chamber |
| 8, 8a, 8b | Sound insulation |
| 9 | Closure device |
| 10 | Signal line |
| 11 | Date processing unit |
| 12 | Memory unit |
| 13 | Lines |
| 14 | Optical sensor device |
| 15 | Signal lines |
| 16 | Signal lines |
| 17 | Scrambling unit |
| 18 | Data transmission path |
| 19 | Data processing unit |
| 20 | Local computer |
| 21 | Memory |
| 22 | Display device |
| 23 | Line |
| 24 | Line |
| 25 | Line |
| 26 | Reading unit |
| 27 | Control line |
| 28 | Actuator |
| 29 | Line |
| 30 | Data network |
| 31 | Database |
| 32 | Loudspeaker |
| 33 | Second optical sensor device |
| 34 | Pressure sensor device |
| 35 | Line |

| | |
|----|-----------------------------|
| 36 | Acoustic feedback devices |
| 37 | Rechargeable battery |
| 38 | Spring |
| 39 | Fingerprint sensor |
| 40 | Inclination sensor |
| 41 | Cord |
| 42 | Spring steel holder |
| 43 | Pen refill holder |
| 44 | LED |
| 45 | Photodetector |
| 46 | Lens |
| 47 | Beam driver |
| 48 | First optical sensor device |
| 49 | Body |
| 50 | Four-quadrant photodetector |

Please delete the paragraph from line 1 of page 47 through line 14 of page 48 as follows:

~~List of reference symbols~~

| | |
|----------------------|--|
| 1 | Biometric acoustic writing system |
| 2 | Pen |
| 3 | Pen housing |
| 4 | Substrate |
| 5a, 5b | Microphones |
| 6 | Sound body |
| 7 | Airborne <u>air bearing</u> sound chamber |
| 8, 8a, 8b | Sound insulation |
| 9 | Closure device |
| 10 | Signal line |
| 11 | Data processing unit |
| 12 | Memory unit |
| 13 | Lines |

| | |
|----|------------------------------|
| 14 | Optical sensor device |
| 15 | Signal lines |
| 16 | Signal lines |
| 17 | Scrambling unit |
| 18 | Data transmission path |
| 19 | Data processing unit |
| 20 | Local computer |
| 21 | Memory |
| 22 | Display device |
| 23 | Line |
| 24 | Line |
| 25 | Line |
| 26 | Reading unit |
| 27 | Control line |
| 28 | Actuator |
| 29 | Line |
| 30 | Data network |
| 31 | Database |
| 32 | Loudspeaker |
| 33 | Second optical sensor device |
| 34 | Pressure sensor device |
| 35 | Line |
| 36 | Acoustic feedback devices |
| 37 | Rechargeable battery |
| 38 | Spring |
| 39 | Fingerprint sensor |
| 40 | Inclination sensor |
| 41 | Cord |
| 42 | Spring steel holder |
| 43 | Pen refill holder |
| 44 | LED |
| 45 | Photodetector |
| 46 | Lens |
| 47 | Beam driver |

48 ~~First optical sensor device~~
49 ~~Body~~
50 ~~Four-quadrant photodetector~~

Please replace the paragraph at line 1 of page 49 with the following amended paragraph:

~~Patent~~ Claims